

In re Patent Application of:
MOREAUX ET AL.
Serial No. 10/060,105
Filing Date: **January 29, 2002**

REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application. The arguments supporting patentability of the claims are presented in detail below.

I. The Claims Are Patentable

Independent Claims 9, 16, 22 and 28 have been rejected over the Kim patent. The present invention, as recited in independent Claims 9, for example, is directed to a detection device for detecting a defective power supply connection in an integrated circuit. The integrated circuit comprises at least one internal power supply line, and at least one power supply pad connected to the at least one internal power supply line and to be connected to an external device for receiving an external voltage. The integrated circuit also comprises at least one input/output pad to be connected to the external device for receiving the external voltage.

A pull-up or pull-down device is connected between the at least one input/output pad and the at least one internal power supply line. The detection device also comprises a detection circuit for comparing voltage levels between the at least one input/output pad and the at least one internal power supply line for determining if the power supply connection with the external device is defective.

The detection device in accordance with the present invention advantageously determines if the power supply connection with the external device is defective. If the power supply connection is determined to be defective, the

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detection circuit may generate a defective connection signal for turning off at least a portion of the integrated circuit, as recited in dependent Claim 15 for example. Reference is directed to page 1, lines 6-18 in the Applicants' specification, which provides:

"Using a smart card as an example, the integrated circuit within such a card receives its power from a coupler or card reader, which typically includes Vdd and Gnd. The quality of this card/coupler link may be defective, wherein the serial contact resistance values are very high. The quality may be affected by wear and tear or corrosion of the pads of the integrated circuit. Another cause of deterioration in the quality of the card/coupler link is fraud. That is, an ill-intentioned third party may deliberately damage this link, for example, by putting adhesive on one or more pads of the card to cause it to operate abnormally." (Emphasis added.)

In other words, the detection device in accordance with the claimed invention may function as a safety device by preventing a malfunctioning in the integrated circuit that might be caused by a defective power supply connection.

Referring now to Kim, and in particular to FIGS. 2 and 3, a smart card 35 receives an external voltage (the supply voltage Vcc and the program voltage Vpp) via input/output pads C1-C8, and includes a voltage detector 17 for protecting the internal circuits thereof. The voltage detector 17 includes first and second over-voltage/over-current protectors 22 and 25, and generates enable signals if the detected voltage levels are lower than a predetermined

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level.

First, the function of the voltage detector 17 in Kim is for determining if a voltage supplied from an external device (such as a card reader) needs to be adjusted because the voltage is too high - and not for determining if the power supply connection is defective, as in the claimed invention. For instance, if the voltage being supplied to the smart card in Kim is from an earlier model card reader, and this voltage is higher than what is required for newer technology smart cards (reference column 2, lines 32-45 of Kim), then the detection device in Kim is able to make this determination and adjust the voltage accordingly.

Even though the voltage detector 17 may function as a safety device (i.e., by adjusting a level of the received voltage to a correct operating level), it does not make a determination as to whether or not the power supply connection providing the received voltage is defective. The level of the received voltage is not a consequence of a defective quality of the pad making the link between the card and the card reader (as in the claimed invention), but is a consequence of the type of reader itself which is not compatible with the specified supply voltage of the card, particularly because the supply voltage may be provided from an earlier model card reader.

The Examiner still maintains the position that Kim discloses at least one pull-up/pull-down device connected between an internal power supply line (receiving the supply voltage **Vcc** or the program voltage **Vpp**) and one of the input/output pads receiving the same supply voltage **Vcc** or program voltage **Vpp**. The Examiner further states that it is

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Serial No. 10/060,105
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"inherent" that pull-up/pull-down devices are used to protect circuitry connected to input/output pads.

The Applicants respectfully submit that Kim fails to disclose such a configuration. The smart card in Kim discloses a first internal power supply line receiving the source voltage **Vcc** and a second internal power supply line receiving the program voltage **Vpp**. The level comparators **23** and **26** compare the source and program voltages **Vcc** and **Vpp** to respective thresholds, and generate enable signals if the detected voltage levels are lower than the respective thresholds. Reference is directed to column 3, lines 37-55 of Kim, which provides:

"A voltage detector **17** is composed of first and second over-voltage/over-current protectors **22** and **25** for respectively detecting over-voltage/over-current of the supply voltage **Vcc** and the program voltage **Vpp** to protect the internal circuits of the smart card **35** from the over-voltage/over-current. The first and second over-voltage/over-current protectors **22** and **25** may be made of a switching element such as a transistor or a polyswitch to protect the smart card **35** from the over-voltage/over-current. . . . Further, to protect the smart card **35** from the over-voltage, a diode or transistor may be used." (Emphasis added.)

Kim thus fails to teach or suggest a pull-up or pull-down device connected between the at least one input/output pad (receiving the supply voltage **Vcc** or the program voltage **Vpp**) and an internal power supply line (receiving the same supply voltage **Vcc** or program voltage

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Vpp).

In the claimed invention, when a card/coupler connection is defective with respect to the power supply pad, the internal power supply of the integrated circuit can be obtained indirectly by the at least one input/output pad of the integrated circuit via the pull-up or pull-down elements connected between these pads and the internal power supply line. Kim fails to disclose such a configuration.

Moreover, the detection device as recited in the claimed invention may advantageously detect high values of series contact resistances at the power supply pad of the integrated circuit. As recited in Claim 9, the detection circuit compares voltage levels between the at least one input/output pad and the internal power supply line - and this allows an indirect measure to be carried out of the series contact resistances of the pads of the integrated circuit. If the power supply connection is determined to be defective, the detection circuit may generate a defective connection signal for turning off at least a portion of the integrated circuit, as recited in dependent Claim 15 for example. Such an operation is not disclosed in Kim.


Accordingly, it is submitted that independent Claim 9 is patentable over Kim. Independent Claims 16, 22 and 28 are similar to independent Claim 9. Therefore, it is submitted that these claims are also patentable over Kim. In view of the patentability of the independent claims, it is submitted that their dependent claims, which recite yet further distinguishing features of the invention, are also patentable. These dependent claims require no further discussion herein.

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CONCLUSION

In view of the arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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